PATENT ABSTRACTS OF JAPAN

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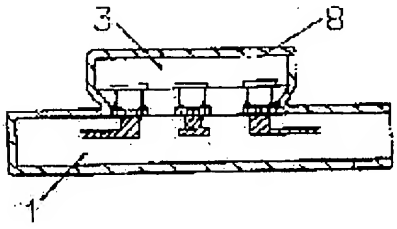
(54) SEMICONDUCTOR MOUNTING METHOD

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a semiconductor mounting method capable of obtaining the improved electric conduction of a semiconductor element on a mounting circuit substrate by uniform external-pressure connection in a semiconductor mounting field in a semiconductor package or a semiconductor module (for instance, a multichip module).



SOLUTION: In a mounting method of electrically connecting a gold bump or a surface layer gold bump formed on the electrode of a semiconductor element 3 to a wiring connection part formed on a mounting circuit substrate 1, the semiconductor element 3 is temporarily fixed on the mounting circuit substrate 1 and after that, electric conduction is obtained by utilizing uniform shrinkage force from the outside of a tube-like thermal contractive molding body 8 containing a polycarbodiimide resin as a main component. The exchange and the replacement of the semiconductor element 3 can be easily and repeatedly performed by using the thermal contractive molding body 8.

LEGAL STATUS

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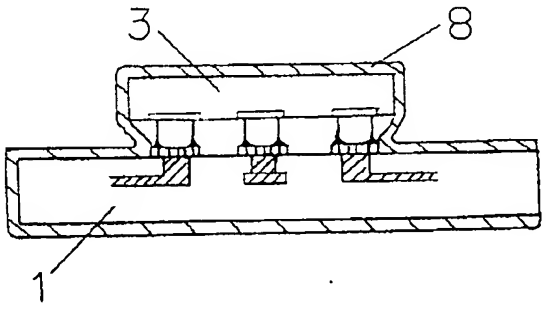
(54)【発明の名称】　半導体実装方法

(57)【要約】
【目的】本発明は、半導体パッケージや半導体モジュール（例えばマルチチップモジュール）における半導体実装分野において、実装回路基板上の半導体素子を均一な外部加圧接続により良好な電気的導通を得ることを可能にした半導体実装方法を提供することを目的とする。
【構成】半導体素子の電極上に形成された金バンプ又は表層金バンプと実装回路基板上に形成された配線接続部とを電気的に接続する実装方法において、半導体素子を実装回路基板上に仮固定した後、ポリカルボジイミド樹脂を主成分とするチューブ状の熱収縮性成形体の外部からの均一な収縮力を利用して電気的導通を得る。上記の熱収縮性成形体を用いることにより、半導体素子の交換、取替えを容易に繰り返し行うことが可能である。



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【特許請求の範囲】
【請求項1】　半導体素子の電極上に形成された金バンプ又は表層金バンプと実装回路基板上に形成された配線接続部とを電気的に接続する実装方法において、半導体素子を実装回路基板上に仮固定した後、ポリカルボジイミド樹脂を主成分とするチューブ状の熱収縮性成形体の外部からの均一な収縮力を利用して電気的導通を得ることを特徴とする半導体実装方法。
【請求項2】　導電性接着剤により仮固定することを特徴とする請求項1記載の半導体実装方法。
【請求項3】　導電性接着剤が、導電性材料と熱可塑性接着樹脂からなることを特徴とする請求項2記載の半導体実装方法。
【発明の詳細な説明】
【0001】
【産業上の利用分野】本発明は、半導体パッケージや半導体モジュール（例えばマルチチップモジュール）における半導体実装分野において、実装回路基板上の半導体素子を均一な外部加圧接続により良好な電気的導通を得ることを可能にした半導体実装方法に関する。さらに好ましい態様は、半導体素子の交換、取替えを容易に繰り返し行うことが可能な半導体実装方法に関するものである。
【0002】
【従来の技術】半導体実装方式として、金属接合を用いたワイヤーボンディング法、ＴＡＢ法、半田バンプを用いたフリップチップ法が知られているが、金属の固相－固相拡散機構あるいは固相－液相反応機構を利用しているため、その接合温度は一般に２００℃以上の高温領域となり、微細線幅化している半導体素子に対して熱ストレスによる損傷を与えやすいという問題が潜在している。また、これらの金属接合は永久接合のため、接続不良発生時に不良半導体素子の交換ができない。
【0003】また、金属接合法では、液晶表示板のＩＴＯ（インジウムチタンオキサイド）透明電極に対しては半導体素子を実装することが出来ないため、最近ではメカニカル接合法として、異方導電膜や導電性粒子を混入した樹脂接着法が用いられているが、これらの方法は半導体素子と実装基板との間に熱硬化あるいは光硬化性樹脂を充填して用いる方法のため、樹脂の経時劣化による接着力低下によって導通不良が生じやすく、また、使用時の熱応力や機械的外部応力によっても部分的な剥離による導通不良が生じやすいという欠点がある。さらに、これらの方法は半導体素子と実装基板との間に熱硬化あるいは光硬化性樹脂が充填されているため、不良半導体素子の交換が困難であり交換、取替え性に難点がある。
【0004】
【発明が解決しようとする課題】本発明は、従来の金属接合法や樹脂接着法による永久接合を目的としたものとは異なり、実装回路基板上の半導体素子を均一な外部加圧接続により良好な電気的導通を得ることを可能にした半導体実装方法、さらに好ましい態様は、半導体素子の交換、取替えを容易に繰り返し行うことが可能な半導体実装方法を提供することを目的とするものである。

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【0005】
【課題を解決するための手段】本発明者らは、従来技術の有する問題点を解決するために鋭意検討を行った結果、実装回路基板上にＩＣ、ＬＳＩ、ＶＬＳＩ等の半導体素子を電気的接続の位置合わせのための仮固定をした後、ポリカルボジイミド樹脂を主成分とするチューブ状の熱収縮性成形体で外周部から被覆し、先ず１２０℃以下の加熱により成形体を収縮させて、その収縮力によって半導体素子と実装回路基板との電気的導通をとり、更にこれを熱硬化させ永久硬化成形体皮膜とすることにより、耐熱性、耐湿性などの各種信頼性に優れる半導体実装方法を見出し、本発明を完成するに至ったものである。
【0006】即ち、本発明は半導体素子の電極上に形成された金バンプ又は表層金バンプと実装回路基板上に形成された配線接続部とを電気的に接続する実装方法において、半導体素子を実装回路基板上に仮固定した後、チューブ状のポリカルボジイミド樹脂を主成分とする熱収縮性成形体の外部からの均一な収縮力を利用して電気的導通を得ることを特徴とする半導体実装方法に関するものであり、仮固定の手段としては通常の接着剤であってもよいが、導電性接着剤により上記バンプと配線接続部を仮固定するのが好ましい。また、導電性接着剤は金属粉末、金属メッキ樹脂ボール等の導電性材料とエチレン－酢酸ビニル共重合体、ポリアミド、ポリアクリレート、ポリエステル、ポリウレタンなどの熱可塑性接着樹脂からなるものがより好ましい。
【0007】次に、本発明を図面を参照して具体的に説明する。図１は半導体素子を実装回路基板上に仮固定した状態を示す斜視図、図２は図１のＡ－Ａ’線により切断して矢印方向から見た断面図であり、実装回路基板１上の配線接続部（接続端子）２には、半導体素子３の電極４上に設けられた金バンプ又は銅、ニッケルなどの金属をコアとする表層金バンプ５が導電性接着剤６により電気的接続の位置合わせのために仮固定されている。７は回路パターンを示す。図３は、図２の如く半導体素子を実装回路基板上に仮固定したユニットをポリカルボジイミド樹脂を主成分とするチューブ状の熱収縮性成形体８に装填した状態を示す断面図であり、図４は上記のチューブ状の熱収縮性成形体８を加熱してユニットに密着させ、更にこれを熱硬化させ永久硬化成形体皮膜とした半導体実装状態を示す断面図である。なお、上記の説明では、実装回路基板上に一個の半導体素子を実装する例を示しているが、半導体素子は複数個であってもよい。
【0008】本発明に使用するポリカルボジイミド樹脂を主成分とするチューブ状の熱収縮性成形体としては、

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ポリカルボジイミド樹脂に必要により着色剤、充填剤等を添加した溶液を公知の方法（例えばキャスティング法）によりフィルムとし、その後４０～１２０℃の温度で１５０～４００％に均一に延伸して熱収縮性フィルムを作製し、そのフィルムをチューブ状に加工して熱収縮性チューブとしたものが使用される。或いは、先にフィルムをチューブ状に加工またはチューブ状のフィルムを作製しておいて、その後チューブラー延伸法等公知の方法で延伸してもよい。本フィルムはヒートシールなどの方法によって加工できる。チューブ状に加工する際の寸法は、完全収縮時の寸法が実装回路基板の寸法よりも１０～５０％程度小さくなるように設計するのが好ましい。また、収縮前のチューブの面積は、実装回路基板よりも１０～５０％大きくするのが好ましい。

【０００９】次に、半導体素子を仮固定した実装回路基板を上記の熱収縮性成形体（チューブ）内に装填し、４０～１２０℃に加熱する。この時チューブは収縮して、実装回路基板と密着し仮封止される。この時点では、チューブは実装回路基板とは完全接着していないので、導通検査の結果、不良の半導体素子が見つかれば、チューブを裁断すれば不良半導体素子の交換が可能である。導通検査の結果、良好であれば、前記チューブを加熱収縮させた仮封止済みの実装回路基板を、更に１５０～３００℃好ましくは２００～２５０℃の温度で、１分～２時間好ましくは5分～１時間の加熱処理を施すことにより、ポリカルボジイミド樹脂は架橋硬化して、信頼性に優れた永久硬化皮膜となる。以上の操作で封止が完了し、その皮膜は半導体実装基板全体を保護するものである。

【００１０】

【発明の効果】本発明の半導体実装方法は、半導体素子の電極上に形成された金バンプ又は表層金バンプと実装回路基板上に形成された配線接続部とを電気的に接続するに際して、半導体素子を実装回路基板上に仮固定した後、チューブ状の熱収縮性成形体の外部からの均一な収縮力を利用して電気的導通を得る外部加圧による接続方式であるため、半導体素子が大型化しても均一な加圧が可能であり、接続不良の発生が少ない特徴を有する。また、チューブ状の熱収縮性成形体として、ポリカルボジイミド樹脂を使用しているので、架橋硬化前の状態では容易に回路基板から成形体皮膜を取り除くことが出来るため、半導体素子の着脱や交換も可能であり、経済的にも優れる実装方法である。さらに、架橋硬化後の成形体皮膜は、外部環境保護用被覆材として使え、耐湿性等の高い信頼性を得ることが出来る。

【００１１】

【実施例】次に、本発明を実施例により具体的に説明する。なお、以下の文中において部とあるのは重量部を意味する。

実施例１

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４，４'－ジフェニルメタンジイソシアネート１００部をカルボジイミド化触媒（３－メチル－１－フェニルホスホレン）０．０６部と共にトルエン５００部中で１００℃、６時間反応させて、ポリカルボジイミド樹脂溶液を得た。この溶液をガラス板上にキャスティングし、１１０℃の熱風乾燥機にて２０分間乾燥して、厚さ７０μmのポリカルボジイミドフィルムを得た。このフィルムを８０℃で２倍に延伸し、その状態で室温まで冷却し熱収縮性フィルムとした後、直径３．５ｃｍとなるようにチューブ状にして端部をヒートシーラーにて接合し、熱収縮性チューブを作製した。

【００１２】この熱収縮性チューブを４ｃｍの長さに切断し、マッシュルーム型金バンプ１２０個を有する半導体素子を導電性接着剤（直径１０μmのニッケル粒子を分散させたエチレン－酢酸ビニル共重合体樹脂）で配線接続部に仮固定した４ｃｍ×４ｃｍで高さ３ｍｍのセラミック回路基板を上記チューブ内に装填し、１００℃で２分間加熱してチューブを収縮させ、フィルム面を回路基板に完全密着させた。さらに、この回路基板を２３０℃で１時間加熱処理してフィルムを硬化させ、永久硬化皮膜とした。この回路基板の半導体素子の接続特性を評価した結果、良好な電気的導通が得られ、剥離による導通不良は生じなかった。また、この基板について１５０℃で１０００時間の高温放置試験を行ったが、皮膜に何ら変化は見られなかった。

【００１３】実施例２

実施例１と同一の手法にて熱収縮性チューブを作製し、実施例１と同様に半導体素子を仮固定した同サイズのセラミック回路基板を装填し、１００℃で２分間加熱してチューブを収縮させ、フィルム面を回路基板に完全密着させた。ここで半導体素子の接続特性を評価した結果、この半導体素子は不良であることが判った。そこで、フィルムをカッターで切断して除去して、再度、実施例１と同様にして熱収縮性チューブを用いてフィルム面を回路基板に完全密着させた。この回路基板の半導体素子の接続特性と剥離を評価した結果、良好な電気的導通が得られ、剥離による導通不良は生じなかった。その後、この基板を２３０℃で１時間加熱処理してフィルムを硬化させ、永久硬化皮膜とした。この基板について１５０℃で１０００時間の高温放置試験を行ったが、皮膜に何ら変化は見られなかった。

【００１４】比較例１

実施例１のポリカルボジイミド樹脂の代わりにポリプロピレン製の直径３．５ｃｍの熱収縮性チューブを用いた。この熱収縮性チューブを４ｃｍの長さに切断し、実施例１と同様に半導体素子を仮固定した同サイズのセラミック回路基板を装填し、１００℃で２分間加熱してチューブを収縮させ、フィルム面を回路基板に完全密着させた。この回路基板の半導体素子の接続特性と剥離を評価した結果、良好な電気的導通が得られ、剥離による導

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通不良は生じなかった。しかし、この基板について１５０℃で高温放置試験を行ったところ、数時間でフィルムが劣化してしまった。

【図面の簡単な説明】

【図１】本発明において半導体素子を実装回路基板上に仮固定したユニットの一実施例を示す斜視図である。

【図２】図１のＡ－Ａ'線により切断して矢印方向から見た断面図である。

【図３】図２の半導体素子を実装回路基板上に仮固定したユニットをポリカルボジイミド樹脂を主成分とするチューブ状の熱収縮性成形体に装填した状態を示す断面図である。

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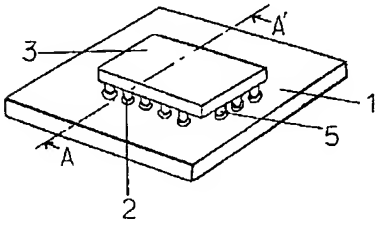
【図４】図３のチューブ状の熱収縮性成形体を加熱してユニットに密着させ、更にこれを熱硬化させ永久硬化成形体皮膜とした半導体実装状態を示す断面図である。

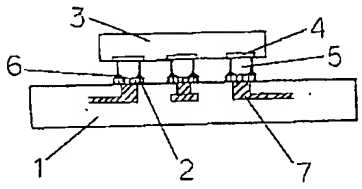
【符号の説明】

1	実装回路基板
2	配線接続部
3	半導体素子
5	金バンプ
6	導電性接着剤
8	チューブ状の熱収縮性成形体

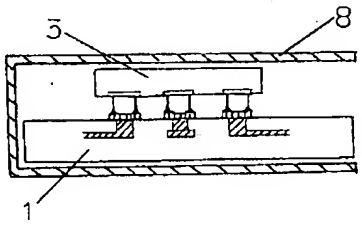
【図１】



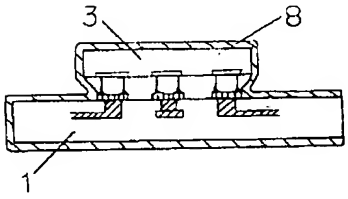
【図２】



【図３】



【図４】



FULL CONTENTS

[Claim(s)]

[Claim 1] In the mounting method which connects electrically the golden bump or surface money bump formed on the electrode of a semiconductor device, and the wiring terminal area formed on the mounting circuit board The semiconductor mounting method characterized by obtaining an electric flow using the uniform contractile force from the outside of the heat contraction nature fabrication object of the shape of a tube which makes poly carbodiimide resin the main ingredients after carrying out temporary fixation of the semiconductor device on a mounting circuit board.

[Claim 2] The semiconductor mounting method according to claim 1 characterized by carrying out temporary fixation with conductive adhesives.

[Claim 3] The semiconductor mounting method according to claim 2 that conductive adhesives are characterized by consisting of a conductive material and thermoplastic adhesion resin.

[Detailed Description of the Invention]

[0001]

[Industrial Application] This invention relates to the semiconductor mounting method which made it possible to obtain a good electric flow for the semiconductor device on a mounting circuit board by uniform external pressurization connection in the semiconductor mounting field in a semiconductor package or a semiconductor module (for example, multi-chip module). Furthermore, a desirable mode is related with the semiconductor mounting method which exchange of a semiconductor device and exchange are repeated easily and can perform them.

[0002]

[Description of the Prior Art] Although the wire bonding method using metal junction as a

semiconductor mounting method, the TAB method, and the flip chip method using a solder bump are known Since the metaled solid phase-solid phase diffusion mechanism or the solid phase-liquid phase reaction mechanism is used, the problem of the welding temperature serving as a high temperature field of 200 degrees C or more generally, and being easy to do damage by heat stress to the semiconductor device formed into detailed line width is latent. Moreover, these metal junction cannot perform exchange of a poor semiconductor device at the time of faulty connection generating for permanent junction.

[0003] Moreover, [at the metal conjugation method, since a semiconductor device cannot be mounted to the ITO (indium titanium oxide) transparent electrode of a liquid crystal display panel, these days, the resin pasting-up method which mixed a different direction electric conduction film and conductive particles is used as a mechanical conjugation method but] The method which these methods are filled up with heat hardening or a photo-setting resin between a semiconductor device and a mounting board, and is used sake, There is a fault of being easy to produce defective continuity due to the adhesive strength fall by degradation of resin with the passage of time, and being easy to produce the defective continuity by partial exfoliation also by heat stress and mechanical external stress at the time of use. Furthermore, since it fills up with heat hardening or a photo-setting resin between the semiconductor device and the mounting board, exchange of a poor semiconductor device is difficult for these methods, and a difficulty is in exchange and exchange nature.

[0004]

[Problem to be solved by the invention] This invention differs from the thing aiming at the permanent junction by a conventional metal conjugation method and the conventional resin pasting-up method. The semiconductor mounting method which made it possible to obtain a good electric flow for the semiconductor device on a mounting circuit board by uniform external pressurization connection, and a still more desirable mode aim at offering the semiconductor mounting method which exchange of a semiconductor device and exchange are repeated easily and can perform them.

[0005]

[Means for solving problem] The result of having inquired wholeheartedly in order that this invention persons might solve the problem which the conventional technology has, After carrying out temporary fixation for position ****** of electric connection for semiconductor devices, such as IC, LSI, and VLSI, on a mounting circuit board, Poly carbodiimide resin is covered with the heat contraction nature fabrication object of the shape of a tube made into the main ingredients from a perimeter part. By shrinking a forming object by heating of 120 degrees C or less first, taking an electric flow with a semiconductor device and a mounting circuit board, carrying out heat hardening of this further, and considering it as a permanent hardening fabrication body skin film by the contractile force The semiconductor mounting

method of excelling in various reliability, such as heat resistance and moisture resistance, is found out, and it comes to complete this invention.

[0006] Namely, this invention is set to the mounting method which connects electrically the golden bump or surface money bump formed on the electrode of a semiconductor device, and the wiring terminal area formed on the mounting circuit board. It is a thing about the semiconductor mounting method characterized by obtaining an electric flow using the uniform contractile force from the outside of the heat contraction nature fabrication object which makes tube-like poly carbodiimide resin the main ingredients after carrying out temporary fixation of the semiconductor device on a mounting circuit board. Although you may be the usual adhesives as a means of temporary fixation, it is desirable to carry out temporary fixation of the wiring terminal area with the above-mentioned bump with conductive adhesives. Moreover, as for conductive adhesives, what consists of thermoplastic adhesion resin, such as conductive material, such as metallic powder and a metal plating resin ball, an ethylene-vinyl acetate copolymer, polyamide, poly acrylate and polyester, and polyurethane, is more desirable.

[0007] Next, this invention is concretely explained with reference to Drawings. The perspective view showing the state where drawing 1 carried out temporary fixation of the semiconductor device on the mounting circuit board, Drawing 2 is the sectional view which cut by the A-A' line of drawing 1 and was seen from the arrow, and [the wiring terminal area 2 on the mounting circuit board 1 (contact button)] Temporary fixation of the surface money bump 5 who makes a core metal prepared on the electrode 4 of the semiconductor device 3, such as a golden bump or copper, and nickel, is carried out by the conductive adhesives 6 for position ****** of electric connection. 7 shows a circuit pattern. Drawing 3 is the sectional view showing the state where the heat contraction nature fabrication object 8 of the shape of a tube which makes the main ingredients the unit which carried out temporary fixation of the semiconductor device on the mounting circuit board like drawing 2 was loaded with poly carbodiimide resin. Drawing 4 is the sectional view showing the semiconductor mounting state which heats the heat contraction nature fabrication object 8 of the shape of an above tube, was stuck to the unit, was made to carry out heat hardening of this further, and was used as the permanent hardening fabrication body skin film. In addition, a semiconductor device may be plurality although the above-mentioned explanation shows the example which mounts one semiconductor device on a mounting circuit board.

[0008] [the poly carbodiimide resin used for this invention] as a heat contraction nature fabrication object of the shape of a tube made into the main ingredients The solution which added colorant, a bulking agent, etc. as occasion demands to poly carbodiimide resin is used as a film by a well-known method (for example, the casting method). It extends uniformly to 150 to 400% at the temperature of 40-120 degrees C after that, a heat contraction nature film is produced, and what processed the film in the shape of a tube, and was used as the heat

contraction nature tube is used. Or first, the film of processing or the shape of a tube is produced in the shape of a tube, and a film may be extended by well-known methods, such as the tubular extending method, after that. This film is processible by methods, such as heat sealing. As for the size at the time of processing it in the shape of a tube, it is desirable to design so that the size at the time of full contraction may become smaller about 10 to 50% than the size of a mounting circuit board. Moreover, as for the area of the tube before contraction, enlarging 10 to 50% is more desirable than a mounting circuit board.

[0009] Next, it loads with the mounting circuit board which carried out temporary fixation of the semiconductor device into the above-mentioned heat contraction nature fabrication object (tube), and heats at 40-120 degrees C. At this time, it contracts, and a tube is stuck with a mounting circuit board and temporary closure is carried out. Since full adhesion of the tube has not been carried out with a mounting circuit board at this time, if a poor semiconductor device is found as a result of flow inspection, and a tube is cut out, exchange of a poor semiconductor device is possible. If good as a result of flow inspection, further 150-300 degrees C is 200-250 degrees C in temperature preferably about the mounting circuit board which carried out heating contraction of said tube and which has been temporary closed. By giving heat-treatment of 5 minutes - 1 hour preferably for 1 minute - 2 hours, poly carbodiimide resin carries out bridge construction hardening, and serves as a permanent hardening coat excellent in reliability. Closure is completed by the above operation and the coat protects the whole semiconductor mounting board.

[0010]

[Effect of the Invention] The semiconductor mounting method of this invention faces [connecting electrically] the golden bump or surface money bump formed on the electrode of a semiconductor device, and the wiring terminal area formed on the mounting circuit board. Since it is a connection method by the external pressurization which obtains an electric flow using the uniform contractile force from the outside of a tube-like heat contraction nature fabrication object after carrying out temporary fixation of the semiconductor device on a mounting circuit board, even if a semiconductor device is enlarged, uniform pressurization is possible, and generating of a faulty connection has few features. Moreover, since poly carbodiimide resin is used as a tube-like heat contraction nature fabrication object and a forming body skin film can be easily removed from a circuit board in the state before bridge construction hardening, attachment and detachment and exchange of a semiconductor device are also possible, and it is the mounting method of excelling also economically. Furthermore, the forming body skin film after bridge construction hardening can be used as covering material for outside environment protection, and high reliability, such as moisture resistance, can be acquired.

[0011]

[Working example] Next, an example explains this invention concretely. In addition, that it is in the following sentences with a part means a weight part.

An example 14 and 100 degrees C of 4'-diphenylmethane diisocyanate [100 copies of] were made to react in 500 copies of toluene for 6 hours with 0.06 copy of carbodiimide-ized catalyst (3-******- 1-phenyl phospholene), and poly carbodiimide resin solution was obtained. This solution was cast on the glass board, it dried for 20 minutes with the 110-degree C hot air dryer, and the 70-micrometer-thick poly carbodiimide film was obtained. After having extended this film twice at 80 degrees C, cooling to room temperature in that state and considering it as a heat contraction nature film, it was made the shape of a tube, the end was joined in heat sealer so that it might be set to 3.5cm in diameter, and the heat contraction nature tube was produced.

[0012] This heat contraction nature tube is cut in length of 4cm. It loads with a 3-mm-high ceramic circuit board into the above-mentioned tube at 4cm x 4cm which carried out temporary fixation of the semiconductor device which has 120 mushroom type money bumps at the wiring terminal area with conductive adhesives (ethylene-vinyl acetate copolymer resin which distributed nickel particles 10 micrometers in diameter). It heated for 2 minutes at 100 degrees C, the tube was shrunk, and the circuit board was made to carry out full adhesion of the film plane. Furthermore, this circuit board was heat-treated at 230 degrees C for 1 hour, the film was stiffened, and it was considered as the permanent hardening coat. As a result of evaluating the connection characteristic of the semiconductor device of this circuit board, the good electric flow was obtained and the defective continuity by exfoliation was not produced. Moreover, although the high temperature neglect examination of 1000 hours was done at 150 degrees C about this substrate, change was not looked at at all by the coat.

[0013] The heat contraction nature tube was produced by the same technique as example 2 example 1, and it loaded with the ceramic circuit board of the same size which carried out temporary fixation of the semiconductor device like the example 1, and it heated for 2 minutes at 100 degrees C, the tube was shrunk, and the circuit board was made to carry out full adhesion of the film plane. As a result of evaluating the connection characteristic of a semiconductor device here, it turned out that this semiconductor device is poor. Then, the cutter cut and removed the film and the circuit board was made to carry out full adhesion of the film plane again using a heat contraction nature tube like an example 1. As a result of evaluating the connection characteristic of the semiconductor device of this circuit board, and exfoliation, the good electric flow was obtained and the defective continuity by exfoliation was not produced. Then, this substrate was heat-treated at 230 degrees C for 1 hour, the film was stiffened, and it was considered as the permanent hardening coat. Although the high temperature neglect examination of 1000 hours was done at 150 degrees C about this substrate, change was not looked at at all by the coat.

[0014] The heat contraction nature tube with a diameter [made from polypropylene] of 3.5cm was used instead of the poly carbodiimide resin of comparative example 1 example 1. This heat contraction nature tube was cut in length of 4cm, and it loaded with the ceramic circuit board of the same size which carried out temporary fixation of the semiconductor device like the example 1, and it heated for 2 minutes at 100 degrees C, the tube was shrunk, and the circuit board was made to carry out full adhesion of the film plane. As a result of evaluating the connection characteristic of the semiconductor device of this circuit board, and exfoliation, the good electric flow was obtained and the defective continuity by exfoliation was not produced. However, when a high temperature neglect examination is done at 150 degrees C about this substrate, the film has deteriorated in several hours.

[Brief Description of the Drawings]

[Drawing 1] It is the perspective view showing one example of the unit which carried out temporary fixation of the semiconductor device on the mounting circuit board in this invention.

[Drawing 2] It is the sectional view which cut by the A-A' line of drawing 1 and was seen from the arrow.

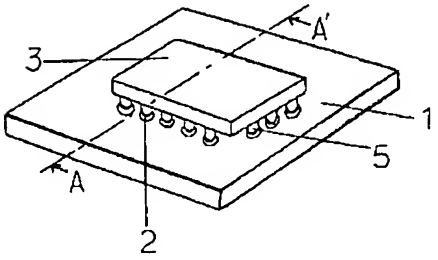
[Drawing 3] It is the sectional view showing the state where the heat contraction nature fabrication object of the shape of a tube which makes the main ingredients the unit which carried out temporary fixation of the semiconductor device of drawing 2 on the mounting circuit board was loaded with poly carbodiimide resin.

[Drawing 4] It is the sectional view showing the semiconductor mounting state which heats the heat contraction nature fabrication object of the shape of a tube of drawing 3 , was stuck to the unit, was made to carry out heat hardening of this further, and was used as the permanent hardening fabrication body skin film.

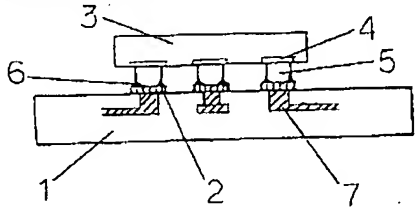
[Explanations of letters or numerals]

1 Mounting Circuit Board
2 Wiring Terminal Area
3 Semiconductor Device
5 Golden Bump
6 Conductive Adhesives
8 Tube-like Heat Contraction Nature Fabrication Object

[Drawing 1]



[Drawing 2]



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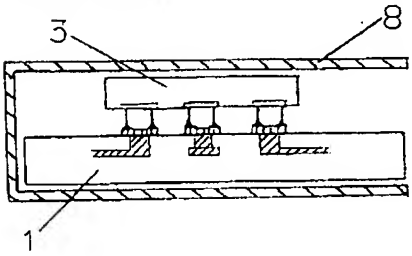
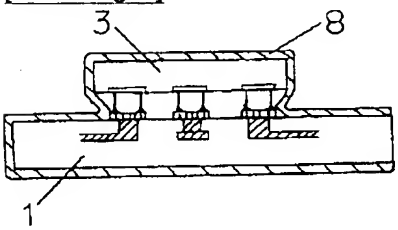


[Drawing 4]



[Translation done.]